ΕΕΑΕ
ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΑΤΟΜΙΚΗΣ ΕΝΕΡΓΕΙΑΣ

Inventory of radioactive waste, disused and orphan sources and materials and sources in use

TABLE 1 : Resins in drums

Location: Interim storage facility of NCSR "Demokritos"

Form Resins

Origin: Past activities of GRR-1, NCSR “Demokritos”

Properties: Radiological, Physical, chemical

Status: In drums

Processing options: Characterization in progress. Disposal option has not been decided

Update: September 2015

Characterization completed

Waste classif.	Storage room	Type	# Drums	Volume, L/drum	Weight, kg/drum	Total Weight, kg	Total activity, MBq	Nuclides (main)	Maximum C_A / drum, Bq/g	Total MBq
VLLW & LLW	A & B (*)	Resins	158	200	100	15800	245	Ag-108m	4.8	15
								Cs-137	160	213
								Eu-152	2	4
								Co-60	6.2	13

(*) : LLW are stored in building A (56 drums) & VLLW in building B (102 drums). Reference date for activities 2011.

TABLE 2 : Radioactive waste produced from GRR-1

Location: NCSR "Demokritos"
Type: Sediment, liquid and activated/contaminated objects
Origin: Past activities of GRR-1, NCSR "Demokritos"
Properties: Radiological, Physical, chemical
Status:
Processing options: Characterization in progress. Disposal option has not been decided, yet
Update: September 2015

Solid Waste

Waste classif.	Storage room	Form	# Drums	Volume, L	Total activity, kBq	Nuclides (main)	Total Activity kBq
LLW	NCSR "D"	Sediment	1	2	300	Ag-108m	50
						Cs-137	
						Eu-152	30
						Co-60	220

Reference date for activities 2011

Solid Waste

Waste classif.	Storage room	Form	# Drums	Volume	Dose rate at 5 cm	Nuclides (main)	Total Activity kBq	Remarks
ILW	B	Metal parts from GRR-1	1 (cement shielding)	< 0.01 m^3	~ mSv/h	Co-60	(*)	Metal objects (e.g. screws) from GRR-1
LLW	A	Objects in drums	53	10 m^3	< 4 µSv/h	Co-60, Cs-137, Ag-108m, Eu-152	(*)	From GRR-1
Historical Waste	B	Objects in drums	100	20 m^3	< 50 µSv/h	(*)	(*)	From GRR-1 and connected facilities
Historical Waste	B	cemented sludge	50	10 m^3	~ 100 nSv/h	Cs-137	(*)	From GRR-1 and connected facilities
Historical Waste	NCSR "D"	Objects in drums	50	10 m^3	~ 100 nSv/h	(*)	(*)	From GRR-1 and connected facilities

(*) to be defined

Table 2 cont'd

TABLE 2 : continued

Liquid waste

Waste classif.	Storage room	Form	# Tanks	Volume, L	Total activity, MBq	Nuclides (main)	Total Activity kBq
VLLW	Liquid waste storage	Water	15	8944	5.70E+05	H-3	5.70E+05
						Cs-137	47
						Co-60	51

Reference date for activities 2011

TABLE 3 : Expected deccommissioning radioactive waste from GRR-1

Location: GRR-1 of NCSR "Demokritos"

Type: Activated /contaminated objects

Origin: Decommissiong of GRR-1. Additional RW may be produced during decommissioning activities.

Properties: Radiological, Physical, chemical

Status:

Processing options: Characterization in progress. Disposal option has not been decided, yet

Update: September 2015

Solid Waste

Waste classif.	Location	Form	# Items	Mass (tons)	Dose rate at 5 cm	Nuclides (main)	Total Activity kBq	Remarks
EW	GRR-1	Metal parts	(*)	30	(*)	Co-60, Cs-137, Ag-108m, Eu-152	(*)	Aluminium, Steel and Stainless Steel
VLLW	GRR-1	Metal parts	(*)	28	(*)	Co-60, Cs-137, Ag-108m, Eu-152	(*)	Aluminium, Steel and Stainless Steel
VLLW (mixed)	GRR-1	Lead	(*)	5	(*)	(*)	(*)	Lead (at the thermal column)
LLW	GRR-1	Metal parts	(*)	0.6	(*)	Co-60, Cs-137, Ag-108m, Eu-152	(*)	Aluminium, Stainless Steel
LLW (mixed)	GRR-1	Lead	(*)	1.8	(*)	(*)	(*)	Lead inside the experimental tubes
ILW	GRR-1	Metal parts	(*)	0.3	(*)	Fe-55, Ni-63, Co-60	(*)	Aluminum, Staintless Steel (support structure of the core and parts of the control rods)
ILW (mixed)	GRR-1	Be blocks and part of the control rods	(*)	0.2	(*)	Fe-55, Ni-63, Co-60, Ag-110m, Ag-108m, Cd-109, H-3	(*)	Be and Ag-Cd-In
(*)	GRR-1	Graphite	(*)	15	(*)	(*)	(*)	Partitioning will be done in the future
(*)	GRR-1 store room	Contaminated objects	(*)	$< 1\ m^3$	tens μSv/h	(*)	(*)	Objects from maintenance, house-keeping, etc

(*) to be defined

TABLE 4 : Disused sources

Location: see table

Type: Disused surces stored at NCSR "D" and at user's facities (on site)

Origin: Past -current activities of operator

Properties: Radiological

Status: Raw material

Processing options: Awaiting for recycling

Update: August 2015

Location	Source Category	# sources	Total activity, MBq	Nuclides
Interim Storage NCSR "D, Building A	1			
	2	1	2.18E+07	Co-60
	3	42	4.53E+05	Cs-137, Am241/Be, Sr-90, Co-60
	4	7	1.67E+03	Co-60, Kr-85, Cs-137
	5	209	4.99E+04	Co-60, Cs-137, Ir-192, Sr-90, Mbn-54, Ra-226, Am-241, C-14, Pm-147
On site (facilities countrywide and in GRR-1 storage room)	1	3	5.22E+08	Co-60
	2			
	3	4	5.92E+05	Am-241, Pu-239/Be
	4	57	6.07E+05	Cs-137, Am-241, Ra-226, Th-232, Eu-152
	5	210	2.03E+05	Ra-226, Ni-63, Co-60, Cs-134, Cs-137, Sr-90, Kr-85, Pb-210, U-238, Am-241, Hg-203, Mn-54, Ba-133, Na-22, Co-57
Total		533	5.46E+08	

TABLE 5 :	**Radioactive material**
Location:	Interim Storage NCSR "D and on-site at other facilities (storage)
Type:	Consumer products, Instruments, contaminated objects
Origin:	Past activities of operator, illicit traficking
Properties:	Radiological
Status:	Raw meterial
Processing options:	Characterization in progress. Disposal option has not been decided, yet
Update:	August 2015

Location	Type	Origin	# items / quantity	Activity	Nuclides
Interim Storage NCSR "D	Lighting rods	Collected from sites	154	~ 50 MBq/item	Am-241, Ra-226
	Smoke detectors	Collected from sites	3107	~ 0.03 MBq/item	Am-241
	Consuler products, intsrumens, objects	Vehicle instruments, lamps, depU blocks	2298	various (*)	Ra-226, Am-241, Th-232, Sr-90, depU
	Contaminated soil, objects	Illegal actions, illicit traficking	3 drums	(*)	Pu-238, Pu-239, Pu-240, Pu-241
	Metal plates with evaporated Pu-238	Illegal actions, illicit traficking	250	(*)	Pu-238, Pu-239, Pu-240, Pu-241. Evaporation on metal plates
On-site (in facilities, countrywide)	Lightning rods	Activities of user	472	50 MBq/item	Am-241, Ra-226
	Consuler products, intsrumens, objects	Vehicle instruments, lamps	10 drums	(*)	Ra-226
	Insineration Ash	Scrap metal industry	50-100 m^3	(*)	Cs-137
	Contaminated objects with NORM	Excavation industry	100 m^3	Max activity concentration, C_A =5E3 Bq/g	Ra-226

(*) unkonown at the moment, to be defined

TABLE 6 : Orphan sources

Location: On site

Type: Orphan surces stored on site, where they detected (metal industies, scrap metal facilities, customs)

Origin: Scrap Metal

Properties: Radiological

Status: Raw material

Processing options: Characterization in progress. Disposal option has not been decided, yet

Update: August 2015

Location	Source Category	# sources / devices	Form	Total activity, MBq	Nuclides
On site, at locations / facilities	1				
	2	1	Sealed source	1.85E+07	Cs-137
	3				
	4				
	5	160	objects		Ra-226, Am-241, Th-232, Sr-90, depU
Total		**161**		**1.85E+07**	

(*) unkonown at the moment, to be defined

TABLE 7 : In use Sealed Radiation Sources & other material

Location: see table
Type: SRS, consumer products
Origin: In use
Properties: Radiological
Status: In use
Processing options: After useful life : Repatriation, reuse, recycling or disposal (to be defined)
Update: August 2015

Location	Category	# sources	Total activity, MBq	Nuclides
On site	1	36	6.53E+10	Co-60, Cs-137
	2	97	1.05E+09	Ir-192, Se-75, Cs-137, Co-60
	3	28	8.52E+06	Am-241, Cs-137, Ir-192, Co-60,
	4	415	1.68E+06	Co-60, Cs-137, Am-241, Ir-192, Sr-90, Ra-226, Se-75, Cf-252, Gd-153, Eu-152
	5	1822	1.60E+06	Ra-226, Ni-63, Co-60, Cs-134, Cs-137, Sr-90, Kr-85, Pb-210, U-238, Am-241, Hg-203, Mn-54, Ba-133, Na-22, Co-57, Eu-152, Cd-109, Pm-157
Total		**2398**	**6.64E+10**	

Location	Category	# sources	Activity, MBq	Nuclides
On site	Lighning rods	~ 1000	~ 50 MBq/item	Am-241, Ra-226
	Smoke detectors	unkown	~ 0.03 MBq/item	Am-241